

The 14th

ASIA CONSTRUCT CONFERENCE

23-24 October, 2008

Indonesia Theme Paper

PREPARED BY

National Construction Services Development Board

PRODUCTIVITY IMPROVEMENT OF THE CONSTRUCTION INDUSTRY: A CASE OF INDONESIA

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SUMMARY

The Indonesian construction industry has played a major role in the national development since many decades ago. In the national level, many public infrastructures, such as roads, water & sanitation, irrigation and dam, drainage systems and buildings both residential and non-residential spreading across the country have been completed and are the evidences of the industry outputs. The industry has contributed up to 8% of GDP. The value of construction output has increased double from 39,050,643 IDR Million in 2003 to 71,943,309 IDR (Million) in 2006. In the company level, many evidences showed that construction projects were completed by national contractors within budget and schedule as well as quality requirement. For example, a building with 847,175 m² and its contract sum 4.964 IDR Billion can be finished within 90 days. However, in general most of industry players need to improve their efficiency of project delivery. Productivity of construction labour varies, for instance, a carpenter working for concrete formwork has a daily productivity about 59 m². For the sake of productivity improvement, the government and the Construction Services Development Board have been promoting the improvement of productivity by such as training for construction labours and improving competence standard for construction people. Currently, under government budget the the government in collaboration with the board are providing a capacity building for more than 2,000 construction engineers across the country as then target. This program will be continuously provided for improving high level competence of the construction industry.

CURRENT STATE OF THE INDUSTRY PRODUCTIVITY

Productivity can be defined as a measure of activities' output within a certain unit of time. The following cases may describe a construction productivity in the project level rather than labour level. The Tukad Bangkung Bridge Project located in Bali was constructed by ISTAKA-HUTAMA KARYA Jo Contractor. Its contract price of phase I was IDR 26,254,000,000.00 and project period of construction was 810 days (September 2001 to December 2003). The second contract of phase II was IDR 23,676,115,000.00 and period of construction was 868 days (16 June 2004 to 31 October 2006). Type of Bridge is Concrete Box Girder Balanced Cantilever, Length of Bridge is 360 meters, Wide of Bridge is 9.6 meters, type of Girder is Single Box Girder with Concrete Pre-stressed, Pier is Concrete Pre-stressed, Distance between piers is 120 meters. The Highest of Pier is 71.14 meters, Type of Foundation of pier is Caisson with Secant Pile, 41 meters deep, Type of Foundation of Abutment is Pile Concrete diameter 60 centimeters. This project included 1.3 kms road betterment approaching the bridge. The total contract amount of this project was IDR 49,930,115,000.00 for the project duration 1,678 days. It means that the contractor's daily productivity in term of financial measure was about IDR 29,756,000 (www.hutama-karya.com).



The other bridge construction project with the following specification was completed within 720 days. This project was located in Kalimantan Island. The bridge has the following specification: the



highway standard: A class, 7 ms width; Width of bridge: 9 ms; Total length : 560.743 ms; Vertical Clearance : 15 m; for the Main Span, Span length : 200 ms; Super Structure: Stell truss (SM 490 YB); Arch heighth: 36 ms; Deck: Reinforced concrete K-350 U-40; and Sub Structure : Steel pipe dia. 1000 mms. For approaching span, Span length : 12 x 30 ms; Structure type : H beam steel, composite girde; Sub Structure : Steel pipe dia. 600 mms. The contract amount of this

project was 105 IDR Billion. This means that the daily output measuring under financial term is about 145.800.000 IDR. These two cases above show variability of production rate for construction projects under different specifications and locations as well as local people involved. In this case, production rate of a construction project will vary according to many factors including technology applied for and complexity of construction project itself. The following table shows the daily output of construction project in term of financial measure.

Table 1 Daily Output of Construction Projects

No	Name of Construction Project	Construction Value (Billion IDR)	Project Completion (Days)	Daily Value Output (Million IDR)
1	The Legian Nirwana Suites	150.933	450	335,4
2	DPRD Building	4.964	90	55,2
3	Tukad Bangkung Bridge	49.930	1678	29,8
4	The Calyx Villas Project	7.624	330	23,1
5	Hill Side Villa and Ancillaries Building	7.734	240	32,2
6	BNI Bank Building Mataram Branch	8.250	360	22,9
7	Rehabilitation of PTPN-10 Building Surabaya	14.737	270	54,6
8	Jembrana Sport Center	13.199	360	36,7
9	Terminal & Sea Tourism Building Tuban	28.342	420	67,5
10	Martadipura Bridge 560 ms	105.000	720	145,8

Source: PT. Hutama Karya (www.hutama-karya.com)

The table above shows the productivity feature of the construction industry in financial term. It looks that the more complex the project is the more time required and therefore it will imply the productivity achievement. It should be noted that most construction projects mainly involve casual works and therefore workmanship or labour performance will affect the industry productivity.

Productivity in construction varies according to many factors. Current research findings (Wuryanti, 2005) on productivity measurement show different level of productivity in construction works under observation. The following table 2 figures out some findings from productivity analysis of 4 composite columns of reinforce concrete.

Table 2 Some findings of productivity analysis

No	Construction Works	Unit	Man-Minute
01	Steel cutting for reinforce concrete	M ³	21.90
02	Steel fixing for reinforce concrete	M ³	28.50
03	Concreting for sloof foundation	M ³	16.56
04	Formwork dismantling on sloof	M ³	4.10
05	Soil stabilisation under floor	M ²	36.10
06	Placing concrete	M ³	17.11
07	Cutting steel profile	M ³	22.00
08	Setting anchor on steel profile	M ³	28.57
09	Painting column	Unit	43.83
10	Setting door framework	Unit	11.32
11	Setting formwork for column	Unit	32.15
12	Setting a coulumn on based plate foundation	Unit	15.26
13	Digging for based plate	M ³	9.33

Source: Wuryanti (2005)

Many studies uncover many factors affecting productivity in construction. They are grouped into different cluster, such as management factors, technology factors, regulatory factors, labour and craftsmen factors, engineering design factors, and other factors. Those factors are summarised as follows:

Management factors:

- Planning and Scheduling
- Organisation and supervision
- Human Factors including motivation
- Site Layout
- Information System
- New and improved construction materials

Technology factors:

- Innovation, methods and technologies
- Equipment utilization

Regulatory factors:

- Local and central government rules and regulation
- Codes and Standards,

Labour and craftsmen factors:

- Motivation
- Training and skills improvement
- Absenteeism/turnover and mobility
- Temporary work assignments
- Overtime
- Motivation, incentives

Engineering design factors:

- Standardisation
- Constructability
- Errors/omissions in plans and specifications
- Design complexities
- Types of contracts

Other factors:

- delays and change orders
- Weather conditions

- Quality requirements
- Economic conditions
- Safety requirements
- Site conditions
- Construction Accidents
- Attitude of work force
- Impractical QA/QC tolerances
- Temporary facilities
- Fundings availability

A study on waste factors affecting project performance (Putra, 2007) found that waiting materials is the highest rank followed by delayed schedule, unskilled labour, waiting for equipment repair, and then waiting for equipment on site.

MEASURES FOR PRODUCTIVITY IMPROVEMENT

Currently there are some ongoing measures for productivity improvement for the Indonesian construction industry covering construction regulation revision, affirmative policy for the construction industry development, strengthening the industry through registration system improvement for contractors and engineering consultants, and also capacity building for professional engineers and construction labours.

The government is currently revising the government act No. 28 Year 2000 of construction services. In the beginning of this year, The Ministry of Public Work has also issued the new standard form of contract and also introduce a new billing rate standard for professional engineer applicable for public work projects. The Ministry also issued a new guideline for health and safety in construction. In order to provide competence standard for engineers, the government also introduces many competence standard for engineering expertise both related to engineering design and engineering supervision. These policies are expected to improve productivity of construction players.

In 2007, the National Construction Services Development Board has also issued a new guideline for contractor and consultant registration and certification systems for contractor and consultant's qualification. In this guideline, the contractor's qualification is ranked into Grade 1 up to G7 and consultant's qualification is ranked into G1 up to G4. Contractors having G7 and G7 are required to have quality assurance system under ISO and also safety standard such as OHSAS.

In order to improve accessibility of capital support for small scale contractors, The Board has also signed a Memorandum of Understanding with the BRI Bank. In this case, a contractor does not need to provide a collateral back up for bank loan, but its contract will be enough for the Bank to issue a loan for the contractor. This will help small scale contractors in particularly to have a capital support for their projects.

The Construction & Human Resource Development Agency, Ministry of Public Work in collaboration with the National Construction Services Development Board are currently pursuing the improvement of professional engineers' competence. By the end of this year, these two institutions are targeting almost 2,000 profesional engineers to have a capacity building programme funded by the government. This programme is designed to help professional engineers to increase their qualification. In this case, the Ministry of Public Work has introduced an affirmative policy for any consultants whose engineers already joined the programme will have 20 score of qualification

assessment in pre-qualification in the government procurement. Another capacity building programme conducted by the Board was international workshop on FIDIC Form of Contract. The Board also issued the contract form translation.

Since earthquake disaster occurred in Aceh, Yogyakarta and West Sumatera, the government has provided a training programme for construction labours, particularly for earthquake resistant of non-engineered housing, such as bricklayers, concreters, joiner and steel fixers.

FUTURE DEVELOPMENT

- In the near future, the Board will introduce a standard form of sub-contract. In this case, the form is required to provide better business engagement between main dan sub-contractors and also to support both parties working under fair contract agreement and better relationship.
- The government and the Board will promote consistently construction export in Middle East Countries. This coming November, Indonesia will join the Big Five Expo in Dubai and roadshow across the region. Currently, some national contractors have already engaged construction projects in UAE, Kuwait, Libya and Qatar.
- The government are currently accelerating infrastructure development both through public spending and promoting PFI (Private Financing Initiative) for infrastructure development. This will increase construction value across the country.
- The government also started to introduce e-procurement for government projects. Currently, semi e-procurement has already applied and in the near future, full e-procurement will be applied. This will make the industry to increase their capacity in order to get better competition.
- Technology development and construction process innovation and also introduction of lean construction are among major targets for the construction industry development. This will achieve through research and development collaboration among academia, business, government and community.

CONCLUSION

Productivity is a key element of the industry to survive in this global era. The higher productivity will benefit the industry as competitiveness increased and finally more added value introduced to society. As a developing nation, the Indonesian construction industry has shown progressive development in term of its capacity, competence and competitiveness both in the industry level and company level. The government and the National Construction Services Development Board have put many attempts to improve the industry productivity. Revisited the construction law, provision of affirmative policies, capacity building programme for professional engineers and labours are provided for empowering the industry. Further attempts have been designed for improving the industry such as increasing construction value both by infrastructure financing and construction export. A capacity building programme will be continuing for different aspects of the construction industry development.

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